

# Work Order ID 61770



Page 1

Thursday, September 02, 2010 11:28:43 AM

Item ID: D350-748-201

Accept



Setup Start



Revision ID:

Item Name: Crosstube Installation; High Aft

Stop



Start Date: 9/2/2010 Start Qty: 1.00



Cust Item ID:

Required Date: 9/20/2010 Req'd Qty: 1.00



Customer:

Reference:

Approvals:

Process Plan:

*Handwritten signature*

Date:

*10-9-02*

Tooling:

Date:

QC:

Date:

SPC (Y/N):

Date:

Run Start



Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
Draw Nbr	Revision Nbr								
D350-748-241	Rev E								

100



DC

Document Control

DOCUMENT CONTROL

0.00

Memo

Photocopy bluefile & type labels per PPPD350-748-201

CHG001

*8/10/10*

*Handwritten: DP 10-12-7*

110



CNC Bend 2

CNC Alpha 160 Bender

BENDING MACHINE - CROSSTUBES

0.00

Memo

Bend tube as per Dwg D350-748-241 using CNC bender program D350A and Folio FT

*Handwritten: DP 10-12-7*

120



QC

Quality Control

QC15- Crosstube Dimensional Check

0.00

Memo

0.00

*8/10/10*

*Handwritten: (Signature)*

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: D350-748-201 PAR #: \_\_\_\_\_ Fault Category: X-tubes NCR: Yes No DQA: 1 Date: 11.02.07  
 Resolution: Accepted Disposition: use as is QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR: <u>61770</u>		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
10.11.07	110	Tube bent high and narrow. R.C. process	CP 10.11.07 CPS1042	Acceptable. Total span only 0.030" below tolerance	N/A	S 10/12/07	CP 10.11.07 CPS1042	S 10/12/07

NOTE: Date & initial all entries



W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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# Work Order ID 61770

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Item ID: D350-748-201

Accept

Revision ID:

Item Name: Crosstube Installation, High Aft

Start Date: 9/2/2010 Start Qty: 1.00

Required Date: 9/20/2010 Req'd Qty: 1.00

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start

Stop

Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Tool ID

Tool #

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

130



Crosstubes

Crosstubes

Crosstubes

Memo

1-Drill Tube as per Dwg D350-748-241 Using DT8876 Drill Jigs,  
Set-up drill table as per QSI 010

2-Deburr

3-Engrave Part # and Batch # as per Dwg D350-748-241

4-Remove all marks from tube within limits of D350-748-241

5- Apply a light coat of LPS3 on the interior of tube  
Batch: 109956

140



QC

Quality Control

QC6- Inspect dimensions to drawing

Memo

140.5

DEFLECT XTube

10/12/21

issue 710 acumen for NDT P10:13181

rec'd + inspect attached report NDT 40610

CD 10/12/21

P10/12/21

SAD 10-12-13

SAD 10-12-22

8/10/12/22

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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Setup Start

Revision ID:

Stop

Item Name: Crosstube Installation, High Aft

Start Date: 9/2/2010 Start Qty: 1.00

Cust Item ID:

Required Date: 9/20/2010 Req'd Qty: 1.00

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
150	Outsource process-Cadplate per QSI017 4.1.9.1	0.00							
	Outsource3	0.00							
	Outsource process - Cad plate								
	Memo Issue P/O: 13189 Stress relief at 375° for 5 hours Magnetic Particle Inspect per ASTM E1444 Cadium Plate per AMS-QQ-P-416B, Class 1, Type 2 Embrittle relief at 375° for 8 hours, Chromate Treat Possible Supplier: Southwest United Industries Ensure Certificate of Conformity is attached								
160	Receive & Inspect for Damage & Mat'l Certs	0.00							
	Packaging	0.00							
	Packaging								
	Memo Ensure certificate of conformity is attached								
170	QC5- Inspect part completeness to step on W/O	0.00							
	QC	0.00							
	Quality Control								

CZ 10/12/22 ①

CZ 11/12/24 ①

S 11/12/24

/ 11/12/24

twist 20.093"

SPN = 81.600" Issue P/O per ASTM 1417 level 24 LPI as per QSI038

710.1367 CZ 11/10/24 ①

no'd &amp; inspect &amp; attached c/c to W/O:

10/10/24

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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Item Name: Crosstube Installation, High Aft

Start Date: 9/2/2010 Start Qty: 1.00



Cust Item ID:

Required Date: 9/20/2010 Req'd Qty: 1.00



Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start



QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
180		0.00							
	SprayPaint								
SprayPaint	Memo	0.00							
Spray Painting	1-Prime inside crosstube as per QSI 005 4.2 2-Paint Outside of Tube as per Dart QSI 005 4.2								
190		0.00							
	QC14- Inspect Spray Paint								
QC	Memo	0.00							
Quality Control	Then, Wrap in plastic bag to protect from scratches								
200		0.00							
	Crosstubes								
Crosstubes	Memo	0.00							
Crosstubes	1-Install Ground wire Insert, then insert screw and washer 2-Install Abrasion strips as per Dwg D350-748-241 & QSI 035. 3-Install supports Using Dt8876 as per Dwg D350-748-241, Torque to 60-80 IN-LBS								

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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Stop

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Required Date: 9/20/2010 Req'd Qty: 1.00

Cust Item ID:

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start

Stop

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

210

QC5- Inspect part completeness to step on W/O

0.00



QC

Memo

0.00

Quality Control

220

Pick Kit

0.00



Packaging

Memo

0.00

Packaging

230

QC4- 100% Inspect kits for completeness

0.00



QC

Memo

0.00

Quality Control

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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**Work Order ID 61770**

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Start Date: 9/2/2010 Start Qty: 1.00

Required Date: 9/20/2010 Req'd Qty: 1.00

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_  
QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start  
Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
240	Packaging	0.00							
	Packaging								
	Packaging								
	Memo	0.00							
	Identify and pack for shipping as per PPPD350-748-201								
	Location: <u>102</u>								
	PPP Rev: <u>A</u>								
250	QC21- Final Inspection - Work Order Release	0.00							
	QC								
	Quality Control								
	Memo	0.00							

11/2/35  
11/02/04  
MF  
11-02-03

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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Page 1

Work Order ID: 61770

Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft




Start Date: 9/2/2010

Required Date: 9/20/2010

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev: A New Issue 06-07-05 JLM  
 IPP Rev: B Update qty of MS21042L5 06-09-12 KJ  
 IPP Rev C Combined manufacturing 08.04.02 EC verified by: DD  
 IPP Rev:D 08-06-24 revD as per dwg DD verified by:EC  
 IPP Rev: E 08.12.11 Step17 was step 21 KJ Verified by:EC IPP Rev:F  
 10.08.04 added QSI010 4.3 DD verf:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D350-748-241TRN  Crosstube Turning Detail		Manufactured	No			110	Each	3.0000	1	1			
<div> <div>Location</div> <div>LG</div> <div>59549</div> <div>59551</div> <div>59587</div> </div> <div> <div>Loc Qty</div> <div>3</div> <div>1</div> <div>1</div> <div>1</div> </div> <div> <div>Loc Code</div> <div></div> <div></div> <div></div> <div></div> </div>													
ALS4-1032-225  Insert		Purchased	No			200	Each	5,336.000	1	1			
<div> <div>Location</div> <div>PK011</div> <div>110768</div> </div> <div> <div>Loc Qty</div> <div>5336</div> <div>5336</div> </div> <div> <div>Loc Code</div> <div></div> <div></div> </div>													
AN960JD10  Washer	NAS1149D0363J	Purchased	No			200	Each	6.0000	1	1			
<div> <div>Location</div> <div>ST</div> <div>107715</div> </div> <div> <div>Loc Qty</div> <div>6</div> <div>6</div> </div> <div> <div>Loc Code</div> <div></div> <div></div> </div>													

B# 116025

10-12-7

11-02-02

11-02-02

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



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Work Order ID: 61770

Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 9/2/2010

Required Date: 9/20/2010

Start Qty: 1.00

Required Qty: 1.00

D2856-400

Manufactured No

200 f

313.4060

1.181

1.243158



Abraison Strip

B# 63735

Location

Loc Qty

Loc Code

ST403

313.4060421

56626

97.4060421

59920

216

1- cut as per dwg D2856

D3502-1

Manufactured No

200 Each

54.0000

2

2



Support

Location

Loc Qty

Loc Code

ST063

12

61206

12

ST066

42

50287

38

52903

4

MS21920-20

Purchased No

200 Each

77.0000

2

2



Clamp (per MIL-DTL-8783C)

Location

Loc Qty

Loc Code

LG

77

112624

6

114687

21

114779

24

115057

26

B# 115736

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Shop Packet Print

Page 2

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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Work Order ID: 61770

Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 9/2/2010

Required Date: 9/20/2010

Start Qty: 1.00

Required Qty: 1.00

MS27039-1-10

Purchased

No

200

Each

126.0000

1

1



Screw



11.02.02

## Location

## Loc Qty

## Loc Code

ST291

126

112794

26

112940

100

AN4-41A

Purchased

No

220

Each

274.0000

8

8



Bolt



3x  
11/2/3 SP M115374

## Location

## Loc Qty

## Loc Code

ST337

40

ST360

234

111424

4

113359

30

114941

100

115108

100

AN4-6A

Purchased

No

220

Each

1,418.000

16

16



Bolt



11/2/3 SP

## Location

## Loc Qty

## Loc Code

ST356

1418

112933

96

113149

19

114523

2

114615

1

114941

500

115108

300

115457

500

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Page 3

W/O:		WORK ORDER CHANGES					
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Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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Parent Item Name: Crosstube Installation, High Aft

Start Date: 9/2/2010

Required Date: 9/20/2010

Start Qty: 1.00

Required Qty: 1.00

AN5-32A

Purchased No

220 Each 196.0000 4 4



Bolt

*Beste 4. en stock*



*M115698 11/2/38*

## Location

## Loc Qty

## Loc Code

ST340

196

113121

4

114056

42

114405

50

115016

50

115108

50

AN960JD416

NAS1149D0463J Purchased

No

220 Each 0.0000 32 32



Washer



*M116301 11/2/38*

AN960JD516

NAS1149D0563J Purchased

No

220 Each 34.0000 8 8



Washer



*M114702 11/2/38*

## Location

## Loc Qty

## Loc Code

ST

34

103694

18

107534

12

109287

4

D3500-1

Manufactured No

220 Each 30.0000 4 4



Saddle



*B63995 11/2/38*

## Location

## Loc Qty

## Loc Code

ST424

30

55605

2

59422

16

60489

12

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Work Order ID: 61770

Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 9/2/2010

Required Date: 9/20/2010

Start Qty: 1.00

Required Qty: 1.00

D3501-1 Manufactured No

220 Each

394.0000 16

Bushing

## Location

## Loc Qty

## Loc Code

ST066

394

45402

15

45918

112

48268

67

53779

100

61196

100

MS21042L4 Purchased No

220 Each

2,363.000 24

Nut

## Location

## Loc Qty

## Loc Code

ST300

2363

113422

68

114523

28

114718

16

114784

331

115108

1920

MS21042L5 Purchased No

220 Each

633.0000 4

Nut

## Location

## Loc Qty

## Loc Code

ST139

133

114813

133

ST300

500

115156

500

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

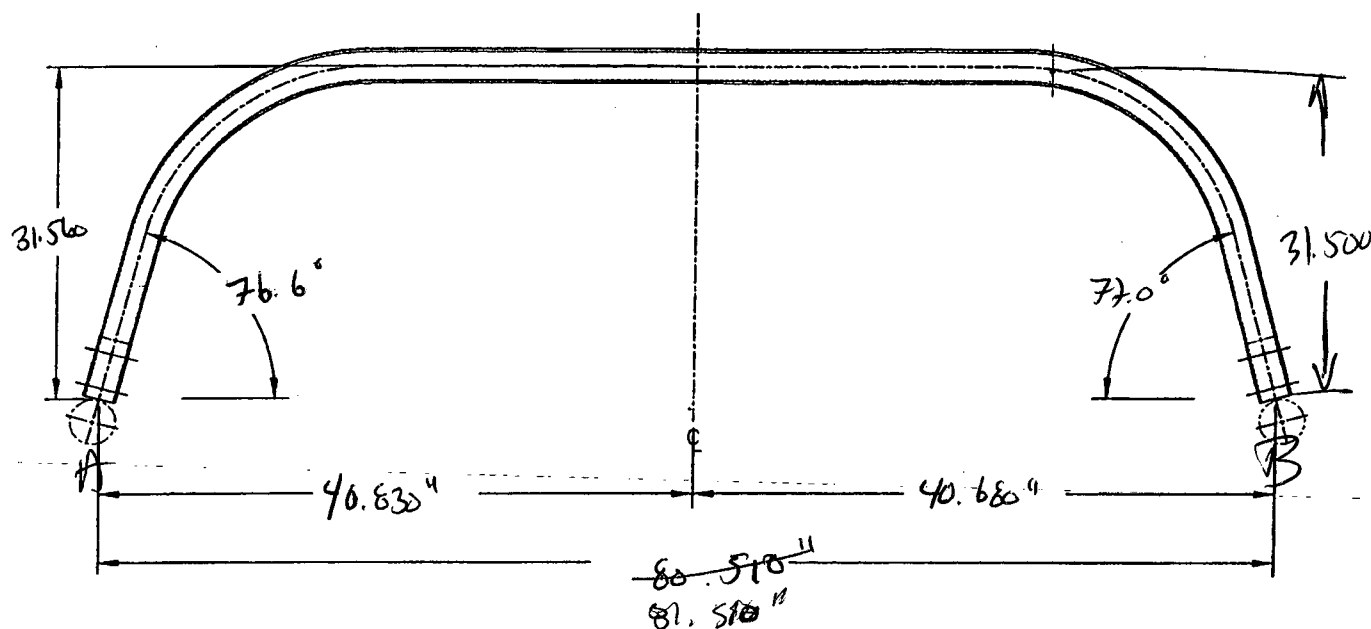
NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



DART AEROSPACE LTD		Work Order:	61770
Description: Crosstube High Aft (AS350/355)		Part Number:	D350-748-201
Inspection Dwg: D350-748-241      Rev: E		Page 1 of 1	

Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06



Comments
First 2 0.184" OK 10.11.07

QC15 Inspection	8
Date	10/12/07

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

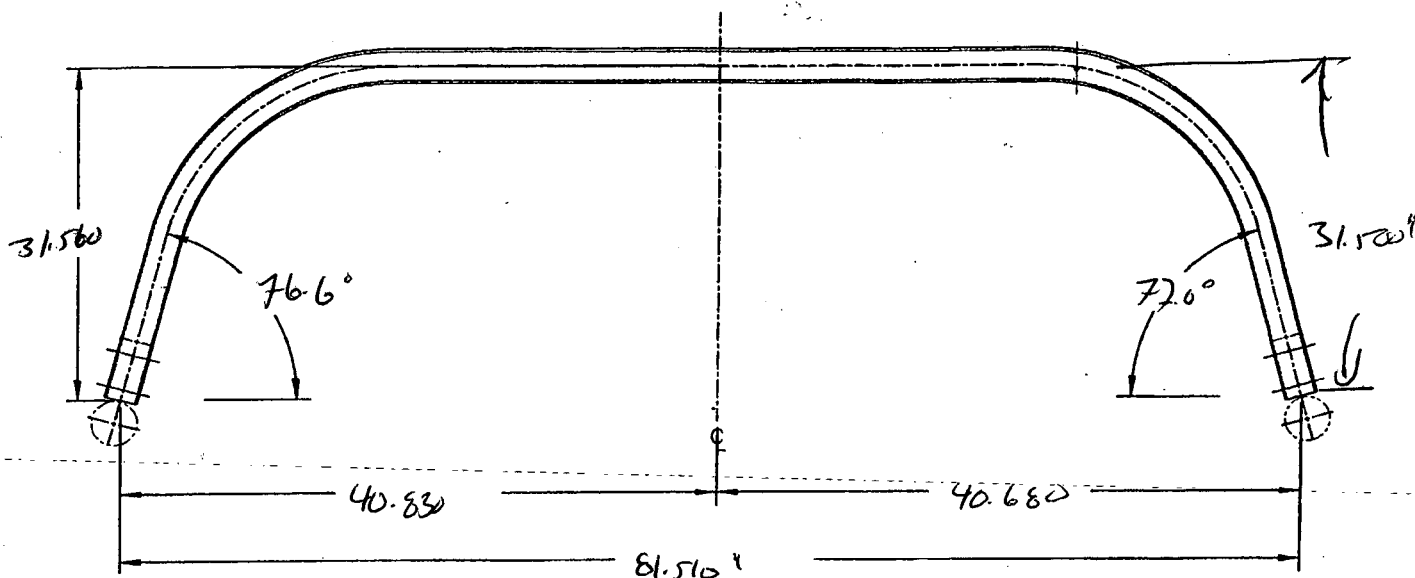
Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

<b>DART AEROSPACE LTD</b>		<b>Work Order:</b>	
<b>Description:</b> Crosstube High Aft (AS350/355)		<b>Part Number:</b>	<b>D350-748-201</b>
<b>Inspection Dwg:</b> D350-748-241 <b>Rev:</b> E			<b>Page 1 of 1</b>

Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06



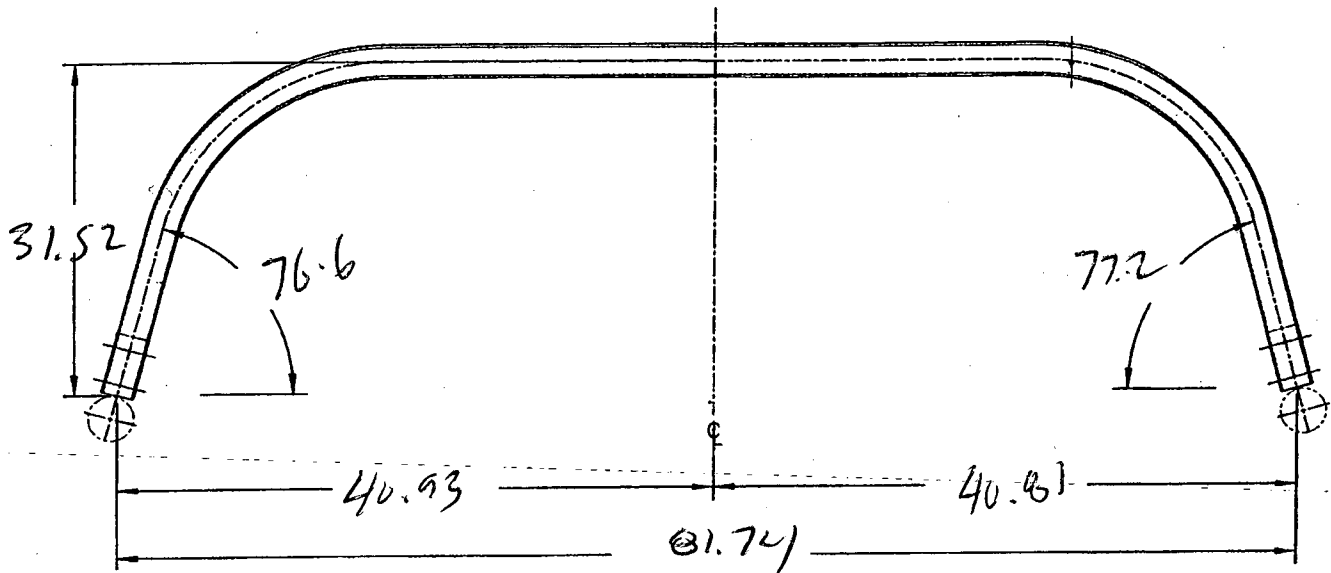
<i>After stress relief</i>	
<i>twist = 0.183"</i>	<b>Comments</b>

QC15 Inspection	<i>8</i>
Date	<i>10/12/08</i>

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	<i>[Signature]</i>

DART AEROSPACE LTD		Work Order:	
Description: Crosstube High Aft (AS350/355)		Part Number:	D350-748-201
Inspection Dwg: D350-748-241      Rev: E		Page 1 of 1	

Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06



Comments
AFTER DEFLECTION TESTING

QC15 Inspection	P 10.12.22
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	

Item	Qty -241	Part Number	Description
1	X	D350-748-241	CROSSTUBE ASSEMBLY (AS 350/355 HI AFT)
2	1	D6018-125	CROSSTUBE
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AEELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

#### GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6018-125  
FINISHED LENGTH = 122.700±0.06
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2  
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D350-748-241" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- 7) WEIGHT: 29.85 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING.
- 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
- 14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

SHOP COPY  
RETURN TO  
ENGINEERING  
UNCONTROLLED COPY  
SUBJECT TO AMENDMENT  
WITHOUT NOTICE  
WORK ORDER  
NO. 46770  
B810-902

**RELEASED**  
2009-10-29

E	REVISE GENERAL NOTES: UPDATE TO CURRENT STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A8-3); ADD TOLERANCES (ZN C6-3, D2-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6018-125 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN	RF	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
DRAWN	RF		
CHECKED	RF	DRAWING NO.	REV. E
MFG. APPR.	RF	D350-748-241	SHEET 1 OF 4
APPROVED	RF	TITLE	SCALE
DE APPR.	RF	CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	09.09.30	COPYRIGHT © 2005 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSES OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

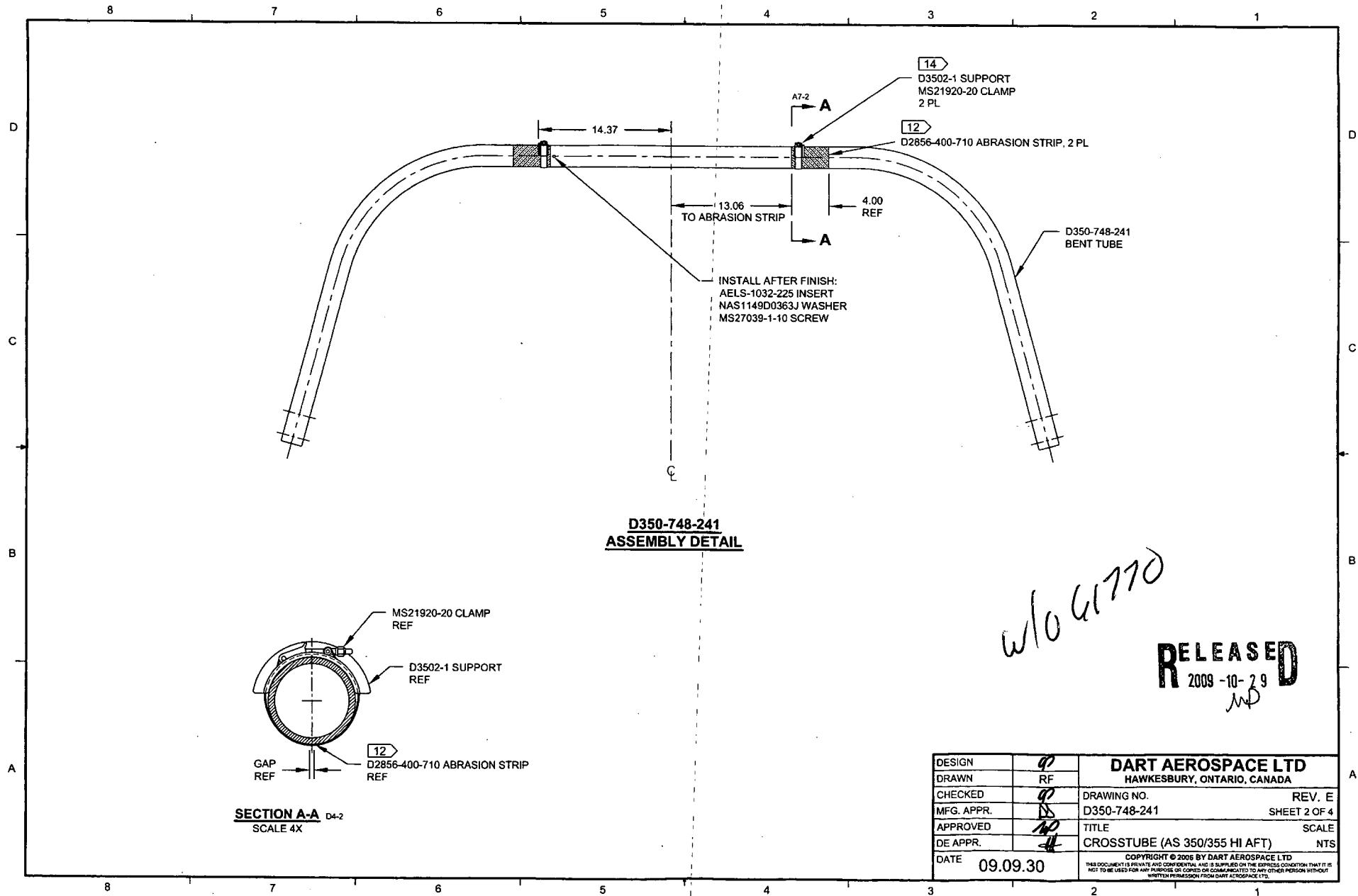
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



w/o 61770

**RELEASED**  
2009-10-29

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

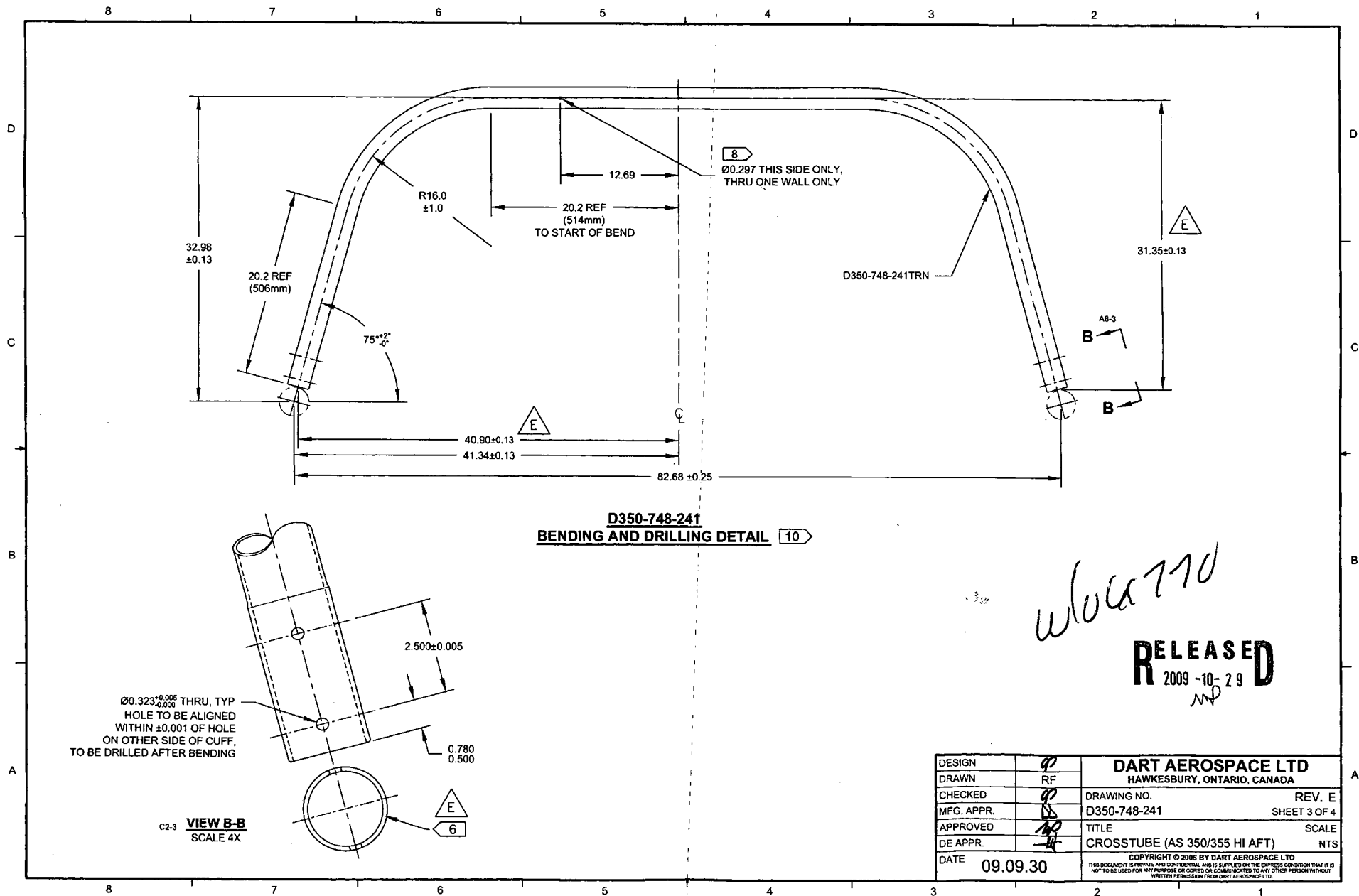
Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries





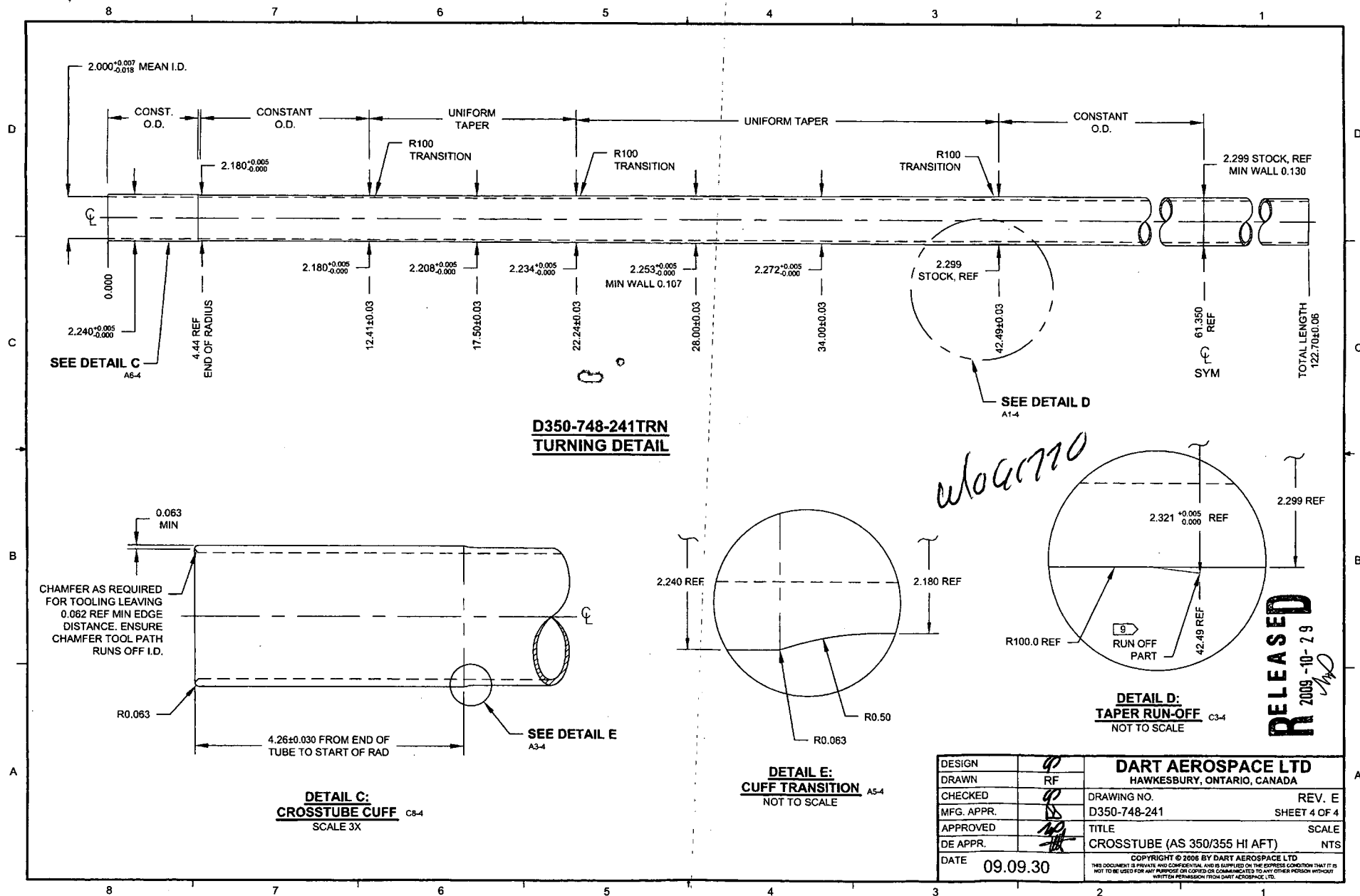
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



## LIQUID PENETRANT TEST REPORT

P- 15199

PAGE 1 OF 1

CLIENT DART AEROSPACE DATE DEC. 21-2010 TIME AM ☒ PM ☐  
ATTENTION LINDA LACELLE ACUREN JOB NO. 188-10-C971  
ADDRESS 1270 ABERDEEN ST. PO/WO NO. 13181  
HAWKESBURY CNT. WORK LOCATION HAWKESBURY PLANT  
ACCEPTANCE STD. ASTM 1417 REV./DATE 2005  
PROJECT SIX CROSS TUBES INSPECT + REINSPECT  
ITEM(S) EXAMINED AFTER DEFLECTION. PROCESS.

JOB DESCRIPTION PROCEDURE NO. LT-002 REV./DATE 2008 TECHNIQUE NO. LT-002 REV./DATE 2008  
PART NO. - MATERIAL STEEL THICKNESS VARIOUS  
SCOPE WET FLOUORESCENT LIQUID PENETRANT INSPECTION  
CARRIED OUT 100% EXTERNAL

## TEST DETAILS

METHOD ☒ FLUORESCENT ☐ VISIBLE ☒ WATER WASH ☐ SOLVENT REMOVABLE ☐ POST EMULSIFIED  
FAMILY BRAND MAGNA FLUX BLACK LIGHT S/N 16459 ☐ OUTPUT > 1000  $\mu$ W/cm<sup>2</sup> ☐ AMBIENT < 2 fc  
PENETRANT ZL67 MINIMUM DWELL TIME 45 MIN. LIGHTING EQUIP. ☐ FLASHLIGHT ☐ TROUBLELIGHT ☐ OUTPUT > 100 fc @ SURFACE  
PENETRANT REMOVER H<sub>2</sub>O MINIMUM DRY TIME >10 MIN. OTHER LABINO  
DEVELOPER SKD52 MINIMUM DWELL TIME 10 MIN. LIGHT METER S/N 1098866 CAL DUE DATE 02-19-2011  
DEVELOPER TYPE ☒ NON AQUEOUS ☐ AQUEOUS ☐ DRY

## TEST SURFACE

SURFACE CONDITION ☐ AS GROUND ☐ AS WELDED ☒ MACHINED ☐ SHOT BLASTED ☒ CLEAN BARE METAL  
SURFACE TEMPERATURE ☐ < -4°C/20°F ☐ -4°C/20°F TO 10°C/50°F ☒ 10°C/50°F TO 52°C/125°F ☐ > 52°C/125°F

RESULTS- ( ☐ METRIC -- ☐ IMPERIAL )

PRIOR  
1 - CROSS TUBE-W.O. 61768 ✓  
1 - CROSS TUBE-W.O. 61767 ✓  
1 - CROSS TUBE-W.O. 61770 ✓  
1 - CROSS TUBE-W.O. 61769 ✓  
1 - CROSS TUBE-W.O. 63592 ✓  
1 - CROSS TUBE-W.O. 63591 ✓  
1 - CROSS TUBE-W.O. 61768 ✓  
1 - CROSS TUBE-W.O. 61767 ✓  
1 - CROSS TUBE-W.O. 61770 ✓  
1 - CROSS TUBE-W.O. 61769 ✓  
1 - CROSS TUBE-W.O. 63592 ✓  
1 - CROSS TUBE-W.O. 63591 ✓  
CROSS TUBES REINSPECTED  
AFTER DEFLECTION  
RESULTS AS FOLLOWS.  
10.12.21

## Scope of Services

The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

## Standard of Care

In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

## SIGNATURES

CLIENT REPRESENTATIVE R. Titley DTR # E63236  
TECHNICIAN (SIGNATURE): [Signature] REPORT REVIEWED BY:  
NAME (PRINT): Mike Johnston NAME INITIALS  
1<sup>ST</sup> TECHNICIAN 2<sup>ND</sup> TECHNICIAN  
CGSB LEVEL # SNT LEVEL \_\_\_\_\_ CGSB LEVEL \_\_\_\_\_ SNT LEVEL \_\_\_\_\_  
CGSB REG. NO. 6606 CGSB REG. NO. \_\_\_\_\_

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	
10.12.21	140.5	- DEFLECT TUBE TO <u>3000</u> lbf FOR 1 MINUTE. - RE-MEASURE HEIGHT & WIDTH.	GP	10.12.21		GP 10.12.21 Q51042	S 10/12/22	
10.12.21	140.6	NDT Tube Following deflection testing.				GP 10.12.21 Q51042	S 10/12/22	

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

**CERTIFICATE OF  
CONFORMANCE**

**CADORATH PLATING CO. LTD.  
2150 LOGAN AVENUE  
WINNIPEG, MANITOBA R2J-0J1**

**DATE:** Jan-14-2011

**CONSIGNED TO:** Dart Aerospace Ltd.  
1270 Aberdeen St.  
Hawksbury, ON K6A 1K7

**W/O #:** 101006

**INVOICE #:** 52908

**CONTRACT OR  
PURCHASE ORDER #**

13189

**DESCRIPTION:** SKID

**QTY** 1

**P/N #** D350-748-201

**S/N #** B61770

**STRESS RELIEF BAKE @375 DEG. BAKE HEAT CHART #11-5. MPI  
INSPECTED IAW ASTM-E-1444. CADMIUM PLATED IAW AMS-QQ-P-  
416C, TYPE 2 YELLOW, CLASS 1. BAKE HEAT CHART #11-24.**

8/11/21/24

**CERTIFICATE: I certify that the items indicated here on have  
been inspected and tested and conform to all specifications  
and requirements detailed on the contract or purchase order.**

**Approved Inspector:**





## LIQUID PENETRANT TEST REPORT

P- 05496

CLIENT

ATTENTION

ADDRESS

PROJECT

ITEM(S) EXAMINED

DATE

ACUREN JOB NO.

PO/WO NO.

WORK LOCATION

ACCEPTANCE STD.

PAGE

OF

TIME

AM

PM

DART AEROSPACE  
LINDA LARUE / CHASTALE / IAN  
1270, ABERDEN ST.  
HAWKESBURY, ON

JAN/26/2011  
188-11-

AS ADDRESS

ASTM1417/AST-038 REV./DATE 2005

WET FLUO PENETRANT INSPECTION ON 14" CROSS TUBES; 4 "collective BEZEL CRACK"

SEE BELOW

JOB DESCRIPTION

PROCEDURE NO. LT-000 REV./DATE 2008

TECHNIQUE NO. LT-000

REV./DATE 2008

PART NO.

MATERIAL

THICKNESS

SCOPE

PERFORMED A WET FLUORESCENT LIQUID PENETRANT INSPECTION ON  
100% OF THE EXTERNAL SURFACE

## TEST DETAILS

METHOD	<input checked="" type="checkbox"/> FLUORESCENT	<input type="checkbox"/> VISIBLE	<input checked="" type="checkbox"/> WATER WASH	<input type="checkbox"/> SOLVENT REMOVABLE	<input type="checkbox"/> POST EMULSIFIED
FAMILY BRAND	MAGDA FLUX		BLACK LIGHT S/N 13798	OUTPUT > 1000 $\mu$ W/cm <sup>2</sup>	AMBIENT < 2 fc
PENETRANT	26-67	MINIMUM DWELL TIME 10 MIN.	LIGHTING EQUIP. <input type="checkbox"/> FLASHLIGHT <input type="checkbox"/> TROUBLELIGHT	OUTPUT > 100 fc @ SURFACE	
PENETRANT REMOVER	H <sub>2</sub> O	MINIMUM DRY TIME > 10 MIN.	OTHER		
DEVELOPER	SKD-52	MINIMUM DWELL TIME 10 MIN.	LIGHT METER S/N		CAL DUE DATE FEB/05/2011
DEVELOPER TYPE	<input checked="" type="checkbox"/> NON AQUEOUS	<input type="checkbox"/> AQUEOUS	<input type="checkbox"/> DRY		

## TEST SURFACE

SURFACE CONDITION	<input type="checkbox"/> AS GROUND	<input type="checkbox"/> AS WELDED	<input type="checkbox"/> MACHINED	<input type="checkbox"/> SHOT BLASTED	<input checked="" type="checkbox"/> CLEAN BARE METAL
SURFACE TEMPERATURE	<input type="checkbox"/> < -4°C/ 20°F	<input type="checkbox"/> -4°C/ 20°F TO 10°C/50°F	<input checked="" type="checkbox"/> 10°C/50°F TO 52°C/125°F	<input type="checkbox"/> > 52°C/125°F	

## RESULTS-

☐ METRIC ☒ IMPERIAL

COMMENTS	ACCEPT	REJECT	
1 4X "collective BEZEL CRACK"	✓		→ NOID 64913 → ITEM ID: D350-748-101 (H.F.)
2 CROSS-TUBE W.O. ID 63591	✓		→ ITEM ID: D350-748-101 (H.F.)
3 CROSS-TUBE W.O. ID 63592	✓		→ ITEM ID: D350-748-101 (H.F.)
4 CROSS-TUBE W.O. ID 63746	✓		→ ITEM ID: D350-748-201 (H.A.)
5 CROSS-TUBE W.O. ID 63747	✓		→ ITEM ID: D350-748-201 (H.A.)
6 CROSS-TUBE W.O. ID 63748	✓		→ ITEM ID: D350-748-201 (H.A.)
7 CROSS-TUBE W.O. ID 63749	✓		→ ITEM ID: D350-748-201 (H.A.)
SEE Page 2 of 2			4/1/01/20

## Scope of Services

The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

## Standard of Care

In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

## SIGNATURES

CLIENT REPRESENTATIVE

TECHNICIAN (SIGNATURE):

NAME (PRINT):

CGSB LEVEL

CGSB REG. NO.

1<sup>ST</sup> TECHNICIAN

SNT LEVEL

3049

CGSB LEVEL

CGSB REG. NO.

2<sup>ND</sup> TECHNICIAN

SNT LEVEL

DTR # E63121

REPORT

REVIEWED BY:

NAME

INITIALS





## RAPPORT D'INSPECTION NON DESTRUCTIVE

(SUITE)

REPORT# P-05496

PAGE 2 DE 2

CLIENT DART AEROSPACE  
ATTENTION LINDA LACELLE / CHARITAKE / IANDATE JAN/26/2011HEURE ☒ AM ☐ PMACUREN W/O : 188-11-02103RÉSULTATS ( ☐ MÉTRIQUE ☒ IMPÉRIALE )

ITEM	COMMENTS	ACCEPT	REJECT	ITEM ID
8	CROSS TUBE W.O. ID 61763	✓		ITEM ID: D350-748-101(H.F.)
9	CROSS TUBE W.O. ID 61764	✓		D350-748-101(H.F.)
10	CROSS TUBE W.O. ID 61765	✓		D350-748-101(H.F.)
11	CROSS TUBE W.O. ID 61766	✓		D350-748-101(H.F.)
12	CROSS TUBE W.O. ID 61767	✓		D350-748-201(H.A.)
13	CROSS TUBE W.O. ID 61768	✓		D350-748-201(H.A.)
14	CROSS TUBE W.O. ID 61769	✓		D350-748-201(H.A.)
15	CROSS TUBE W.O. ID 61770	✓		D350-748-201(H.A.)

— NO REJECTABLE INDICATION WAS DETECTED, AS PER APPLICABLE STANDARD

## Étendue des services

L'entente selon laquelle le Groupe Acuren Inc. exécute les services ne concerne que les énoncés par écrit. En aucune circonstance ces services ne s'étendent au-delà de l'exécution des services demandés. Il est entendu que toutes les descriptions, les observations et les expressions d'opinions faites par Acuren reflètent les opinions ou les observations de l'entreprise fondées sur l'information et les hypothèses fournies par le propriétaire/opérateur, et elles ne constituent pas des déclarations ou des garanties ou ne peuvent être interprétées comme constituant. Le groupe Acuren Inc. n'assume aucune des responsabilités du propriétaire/opérateur, et le propriétaire/opérateur conserve la responsabilité entière des décisions prises en matière d'ingénierie, de fabrication, de réparation et d'usage à partir de l'information ou des données fournies par Acuren en rapport avec les services décrits dans les présentes ne peuvent excéder le coût des services rendus.

## Norme de Diligence

Dans l'exécution des services, le Groupe Acuren Inc. applique le degré de diligence, le soin et la compétence normalement exercés dans des circonstances semblables par d'autres fournisseurs de ce type de services opérant dans la même localité ou dans une localité similaire. Aucune autre garantie, implicite ou explicite, n'est faite ou voulue par le Groupe Acuren Inc.

## SIGNATURES

REPRÉSENTANT CLIENT

TECHNICIEN (SIGNATURE):

NOM (MOULIÉ):

Ian Titley  
MOULÉ  
JVES DESBIERS  
1<sup>er</sup> TECHNICIEN  
ONGC NIVEAU 2 SNT NIVEAU 2  
ONGC N° REGISTRATION 3049

[Signature]  
SIGNATURE  
2<sup>nd</sup> TECHNICIEN  
ONGC NIVEAU — SNT NIVEAU —  
ONGC N° REGISTRATION —

FTJ#: E63121

RAPPORT

RÉVISÉ PAR:

NOM

INITIALES